Chapter 1

Introduction

This chapter details the different parts of the following thesis.

1.1 Research Scope

Ever since it's discovery, fire has been a benefit to manakind but can also be problem, espcially a fire in the built enviroment. Yet, though careful management, design and building, the risk of fire to people and property can be decreased. For this reason, society has deemed that minimising the risk from fire is a worthwhile investment in man hours and money. Due to this, buildings built today have to prove a level of safety that will minimise the risk to occupants. This is achieved through the use of building regulations and restricting how buildings can be built. This approach leads to inflexible and potentially cost over design in some cases and it also focuses on the life safety of building users. Stakeholders in the construction and maintenance of buildings are now questioning whether it is also possible to consider protecting the property as well as keeping the design safe for occupants () - this leads to less fire damage and less costly fires.

Research on fire costs has been carried out over the past 40 years. However, these studies either consider the cost to the national economies (Rutstein and Cooke, 1983, Juås and Mattsson, 1994) or have focussed on a specific system in isolation to the rest of a buildings fire protection (Luck, 1973, Butry, 2009). Work done by Ramachandran on the economics of fire protection (Ramachandran, 1998) brought together various different cost benefit issues together. Whilst the book details the methods used to measure the cost benefits of fire protection, it only provided the theoretical base and no easy to use tool was considered for use during the design stage of a building by those responsible for it's design. Therefore a gap in the knowledge was identified in that no work had been attempted to help fire protection engineers construct a cost effective fire solution, over and above that required in building codes. Building on the work done previously by Ramachandran and others, a decision support tool methodolgy is put forward in this thesis.

Currently, the UK Fire and Rescue Service (FRS) use a tool, the Fire Service Emergency Cover (FSEC) toolkit to analyse fire incidents and plan the location of equipment and resources accordingly. This toolkit uses data from previous incidents to providie statistical evidence for the model. The Decision Support System (DSS) outcome from this project will use the same data to provide an evidence base for the decisions, as well as extra data from additional sources.

My original contribution to knowledge is the construction of a decision support tool methodology for fire engineers, based on empirical evidence, for fire engineers for use in the design phase of a construction

project.

1.2 Aims

The aims of this research are:

Firstly, understand the industries views on when fire enigineers should be involved in a project and how involving fire engineers affects the costs of a project.

Secondly, analyse and interpret fire incident data collected by Department of Communities and Local Government (CLG) and the Fire Protection Association (FPA).

Lastly, using the collected data, consturct a decision support tool for use by fire engineers to easily propose different design proposals to a client and make it clear on the cost benefits of one design over the other.

1.3 Objectives

Specific objectives to meet the aims of this research are as follows:-

1. To investigate the current practise within the fire engineering industry through questionnaires and interviews;
2. Analyse questionnaires and interviews to consider if a cost benefit tool is needed;
3. Review of fire protection measures and their applications;
4. Identify the different aspects that will affect the costs of a final design;
5. Statistically analyse data collected by CLG and FPA;
6. Use the FPA and CLG data as an evidence base, develop a cost benefit tool framework.

1.4 Publications

Publications published as part of this PhD are detailed below and are referenced in the text as required. These are included at the end of this thesis.

1. C Salter, N Bouchlaghem (2011), **Fire Engineering in the UK : A UK Practitioners View**, *International Conference on Building Resilience*.
2. C Salter, G Ramachandran, N Bouchlaghem (2011), **A Cost Benefit Tool for Fire Protection Engineers : An Analysis**, *2nd IRMP Conference*, Glasgow University.

1.5 Structure of Thesis

1. Abstract
2. Contents
3. Intro

- Scope
- Aims
- Objectives
- Publications
- Structure of thesis

4. Literature Review
    - Fire protection
    - Design Tools
    - Methods of data collection
    - Methods of data analysis
    - Methods of software design
5. Methodology
    - Data Collection (Questionnaires and Interviews)
    - Programming
6. Analysis
    - Interview and questionnaire analysis
    - Fire data analysis
7. Discussion
    - Statistical discussion
    - Design tool discussion
8. Conclusions
9. Recommendations
10. Bibliography

Bibliography

Butry, D. T. Economic Performance of Residential Fire Sprinkler Systems. *Fire Technology*, 45(1), 117–143, 2009.

Juås, B. and Mattsson, B. Economics of Fire Technology. *Fire Technology*, 30(4), 468 – 477, 1994.

Luck, H. Economics Of Fire Protection With Fire Detectors. *Fire Technology*, 9, 56–64, 1973.

Ramachandran, G. *The Economics Of Fire Protection*. Taylor and Francis Group, 1998.

Rutstein, R. and Cooke, R. *The Value of Fire Protection in Buildings*. Home Office: Scientific Research and Development Branch, 1983.